

High-Speed Connectors: Around the Clock Design

Home / Component Sourcing

August 26, 2016 Leave a comment Component Sourcing, Featured, Featured Articles, Interconnects

By Gina Roos



New product introductions are the life blood of any component manufacturer and high-speed connector design is no exception. While there may be talk in the industry that 25 Gbit/s design is done and challenges have been solved, it's far from over, according to connector makers. Connector manufacturers continue to focus on performance in areas such as higher density, improved signal integrity, better thermal management, and new options that simplify design and deliver greater design flexibility.

"All of the 25 Gig pieces and components have been developed but it hasn't been deployed in extremely high volumes in the data center or end applications, and is creating significant learning curve issues," said Nathan Tracy, technologist, System Architecture Team and manager of industry standards, [TE Connectivity](#) Data Communications. "The massive scale of turning on all of this new generation equipment and doing it simultaneously keeps you up at night in terms of solving all the little challenges as you break through learning curves."

While connector makers continue to work on improving the performance of 25 Gbit/s connectors, design work also is moving ahead to address the challenge of providing signal integrity at next-generation 50 Gbit/s data rates.

"As you move to higher data rates, susceptibility to crosstalk, impedance mismatches, and signal reflection – all of those little electrical challenges that are in every connector - become that much more significant," said Tracy.

"At the same time, we're also trying to figure out how to do it at a higher density," he added. "When you go to higher density things get closer together and there is more noise and crosstalk."

Another challenge is modulation. Next-generation product isn't necessarily going to use the same modulation that was used in the past, Tracy said. "We now have to discover the new challenges such as using a PAM4 modulation or other technologies that will enable these next generation data rates and aggregate bandwidths."

These types of challenges are keeping the engineering team working around the clock, said Tracy. "We are a global company so as the new team wakes up in the next region of the world we just hand it off and it continues."

"When making a leap in speed per channel, it becomes increasingly difficult from an engineering standpoint, said Jim David, portfolio director for high-speed I/O products, [Amphenol High Speed](#).



Amphenol High Speed's UltraPort QSFP+ family.

"At the high-end and data-center space, high-speed I/O connectors are already starting to transition from 10 Gbit/s per channel to 25 Gbit/s per channel," said David. "The QSFP, for example, offers four channels by 10 Gbit/s, delivering 40-Gbit/s aggregate bandwidth. But there is a lot of interest in moving that interface up to 25 Gbit/s per port with 100 Gbit/s of aggregate bandwidth (4 x 25 or 4 x 28).

"One challenge at 25 Gbit/s that hasn't been at the forefront of product design challenges is thermal management and heat dissipation," said David. "You're taking more ports and putting them closer together and the speed per port is getting faster. Particularly when you bring the optics into play with it, you now

have a considerable amount of heat density that you're trying to extract and take care of."

"With connectors and cables, in general, there are challenges around mechanical robustness, signal integrity, density and termination, and now thermal considerations that come into play so it gets to be fairly difficult and a challenge," David said.

"In some cases, you work with your raw cable suppliers to understand the aspects of the raw cable construction and how it affects the signal integrity and how to marry that cable construction to the termination and your manufacturing - wire management, wire stripping, and wire termination," he added.

At the same time, connector manufacturers need to consider the manufacturing process – quality control, manufacturability, repeatability, and testing.

David believes this comprehensive view, which includes looking at the cable, thermal environment, density and airflow, is critical to ensure the product meets performance requirements but also that the process is manufacturable, repeatable and reliable.

"The challenge is more than managing and coordinating the ramp and the transition," said David. "What may not be clear is that when systems move from 10 Gbit/s to 25 Gbit/s or 28 Gbit/s per channel, quality control, manufacturability, repeatability, reliability and testing also come into play."

The challenge is not just making sure the product can be manufactured and manufactured to the volumes required, it's manufacturing the product consistently and repeatedly, said David.

Amphenol High Speed saw the change coming and put the infrastructure and methodology in place when the industry moved to 10 Gbit/s. "Being able to supply and support the ramp that we think is coming from customers require a more comprehensive view of the supply chain as well as your manufacturing process," David said.

New Products

Many significant new product introductions focus on the I/O connection. At Amphenol High Speed these include QSFP/QSFP+ and mini-SAS HD connectors and related copper and active optical cables (AOCs). One significant product is the stacked and ganged UltraPort QSFP+ connector that supports 100G+ and transmits up to 32 Gbit/s per serial lane.

Other significant products from Amphenol include the Slimline SAS, which is high-density, low-profile connector and cabling interconnect system, targeted at 25 Gbit/s per channel server and blade server applications, and a low cost 25 Gbit/s RCx connector and cable system for inter-cabinet cabling.



TE's STRADA Whisper high-speed backplane connectors.

The backplane for embedded equipment is another big focus for connector manufacturers. The backplane connector connects line cards or switch fabric cards to each other. A significant introduction for TE is the [STRADA Whisper backplane connector family](#). It delivers both a conventional format as well as new options that enable different architectures for next-generation equipment design, addressing issues such as signal loss, reach and routing complexity.

On the power side, TE Connectivity recently launched the [FORGE high power product](#) for power supplies that are plugged into computing and switching equipment. The power drawer connector is a very high power density interconnect that is easily reconfigurable. The manufacturer also offers a high

density solution for line cards – the Multi-Beam XLE connector.

The last piece of the puzzle is high-speed socketing. "Socketing has traditionally been for microprocessor applications, but now we see the same socketing technologies vital to next-generation equipment in terms of other silicon functions," said Tracy.

One of TE's most recent socket introductions is the LGA 3647 IC socket for Intel's processors under its new server platforms. It features a two-piece design for larger processors that addresses the issue of warpage and delivers better coplanarity and reliability.

See related article: [Is the Cloud & IoT the Next Big Thing for High-Speed Connectors?](#)

◀ Amphenol High Speed

◀ Connector Design

◀ Connector Manufacturers

◀ Featured Articles

◀ High-Speed Connectors

◀ TE Connectivity

Gina Roos

Gina Roos is executive editor of *EPS News*. She can be reached at gina.roos@epsnewsonline.com.

EPS NEWS

[HOME](#) [ABOUT](#) [MEDIA KIT](#) [EPS PURCHASING SURVEY](#) [CONTACT US](#) [SITE MAP](#) [REGISTER](#) [LOGIN](#)

© 2016 BBG Enterprises Inc. All rights reserved

Web Design by WR